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ABSTRACT

This information sheet defines teleconferencing as a meeting of three or more people at different locations by telephone and communicating via audioconferencing, audio plus graphics, slow scan television, or full motion video conferencing, and discusses some of the advantages and various applications of this technology. Three major projects that have been influential in the implementation and use of teleconferencing in the United Kingdom (UK) are described: the University of Wisconsin's Educational Telephone Network (ETN); the Learn Alaska Network in the United States; and the Open University in Great Britain. Current developments in teleconferencing in the UK are reported via a discussion of its use as an educational tool and brief descriptions of 13 projects, which range from tutoring groups of medical students dispersed in local hospitals and distance education programs in music and technology, to continuing education for veterinarians and staff development. The work of PACNET (Plymouth Audioconferencing NETwork Project) is highlighted because of its significant contribution in exploring audioconferencing in education and training. Guidelines for getting started with audioconferencing include information on choosing telephone systems and equipment, companies that provide audioconferencing services, and devices that can be used on public networks. Also included are a glossary and a list of 22 selected readings. (DJR)

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Information Sheet 7

Teleconferencing

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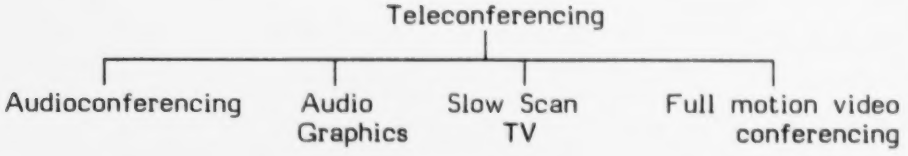
1. What is teleconferencing?

Teleconferencing is a generic term which implies rather than defines a process. Usually teleconferencing means a meeting of three or more people at different locations by telephone. Communication can be audio only, audio plus graphics or audio plus video. In every case except that of full motion video-conferencing, the telephone network is the means by which information is sent and received.

Types of Teleconferencing



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August 1986

Audioconferencing

A meeting by telephone of three or more people linked together via an audioconference bridge. This is the simplest, cheapest and most frequently used form of teleconferencing. It is an innovative extension of an existing technology, the telephone creating the possibility of group meetings and telephone teaching of more than one individual.

Audiographics

Audioconferencing plus transmission of written, graphic and print information.

The non-audio component may be transmitted by:-

- Facsimile - a system which makes it possible to duplicate documents & diagrams at a distant site (point to point only);

- Electronic Blackboard/Tablet
  - electronically produced free handwriting and graphics usually reproduced on a distant TV monitor;

- Computer Systems
  - provide data and/or graphics illustrations which are sent to a compatible computer terminal. Computer graphics may be selected and manoeuvered by using a keyboard, a graphics tablet, a light pen or a joystick.

Slow Scan TV

Audioconferencing plus transmission of visual images to distantly sited TV monitors via telephone lines. Every site being capable of both sending and receiving both sound and vision.

- a moving picture is transformed into a still image. Transmission time varies from 30 seconds to several minutes depending on the resolution of the picture and the speed of transmission. Often called freeze frame or captured frame video.

Full motion videoconferencing

- There are two types:

i Normal TV broadcast method. Uses standby TV circuits i.e. BT Confravision. BT has a small number of public Confravision Studios in the UK and links are possible between two or three.

ii Compressed Video - full video information is compressed by a piece of technology known as a Codec in order to send it down the narrower bandwidth of a special telephone line. Eventually this type of videoconferencing will be switched between private and public studios like a telephone call when the digital telephone network is complete. Point to point international links are also possible.

The compressed video method is cheaper and more flexible than TV broadcast.

2. Background

The three major projects mentioned below have been the chief influences on the implementation and use of teleconferencing in the UK. The Learn Alaska and Wisconsin experience continues with networks heavily committed to educational and training applications. The Open University Cyclops Project has now finished and the hardware modified to re-emerge as the Aregon Excom 100 graphics computer.

2.1 Wisconsin Educational Telephone Network

Based at the capital, Madison, the University of Wisconsin's Educational Telephone Network (ETN) links together over 200 classrooms across the State on a huge party line, enabling students to listen to a lecture or panel discussion, ask questions and share ideas with students hundreds of miles away.

Established in 1965 to tackle the demographical and climatic barriers to distance education in the State, Wisconsin's ETN was first used for the continuing education of doctors. The Department of Postgraduate Medicine began an operator-dialled system intended to provide continuing education to medical staff at low cost. Doctors responded favourably to the technology once they had experienced the benefits of class attendance, questions to speakers and tutor guidance, without the need to leave their home or surgery.

Interest grew in other University departments, and the Educational Telephone Network was established. Within fourteen years, the enrolment figures were comparable with an average university, and by 1971 a unit with sole responsibility for ETN services, Instructional Communication Systems, was formed.

Wisconsin's experience in audioconferencing was followed by a developing use of educational audioconferencing by other U.S. States, particularly Alaska. In addition, universities and government departments within the USA and parts of Europe and Scandinavia began to build audioconferencing into their delivery systems for distance learning and training.

2.2 Learn Alaska

The goal of the Learn Alaska Network, which is based in Anchorage, is to promote lifelong learning opportunities and experiences for Alaskans of all ages, areas of interest and locations. The system offers services that use television, telephone and computers to span the huge distances which separate most Alaskan communities.

Managed by the University of Alaska Instructional Telecommunications Consortium, the Network serves the educational community through the University of Alaska, the Department of Education and the Rural Education Attendance Areas. Combining one-way video through the Instructional Television Network, computer based electronic mail and other computer oriented instructional resources, the audio network can accommodate a variety of educational and instructional needs. Set up in 1981, the Audioconferencing Network alone has expanded to the point where it is currently handling up to ninety conferences per day reaching 250 sites statewide.

2.3 The Open University

The Open University's need for an effective delivery system for tutorials and counselling is transparent. Many effective distance-teaching methods are used including print material, TV and radio broadcast, video and audio cassettes, home experiment kits and summer schools. However, time and cost of travel are obstacles to frequent face to face tutorials for students, and telephone tutoring has been used to accommodate this need.

Three kinds of telephone tutorials are used: home based conference calls, linking up to seven students with a tutor; study centre based calls, which linked students at one or more study centres to a tutor, and one to one tutor-student calls.

In subjects such as science, technology and maths, an additional writing and drawing facility is desirable to augment telephone teaching, and the CYCLOPS project was developed to provide this facility. CYCLOPS was an audio-visual teaching system based on the ordinary television set, standard audio-cassettes, microcomputer technology and telephones, and was a system for sending graphical information down the telephone line. A tutor wrote or drew directly on the television screen with a light pen and the visual data was conveyed by means of a telephone link to other television screens at study centres, where students could simultaneously interact using both graphics and voice. It was also possible to prepare graphics material ranging from simple line drawings to elaborate animations in advance, store them on ordinary audio-cassettes and play them during a conference link up. By combining the versatility of voice-only telephone teaching with the advantages of a graphics display made possible by a telewriting system, a highly effective distance-teaching system became possible.

This OU experiment with CYCLOPS was confined to the East Midlands area, but other educational institutions are also experimenting with what is now called the "Excom 100" computer.

3. Current developments

3.1 Teleconferencing as an educational tool

Teleconferencing makes it possible for distance learners to interact both with tutors and with other students in a way which is immediate, convenient and relatively low in cost. One of the most frequently cited problems for students working alone is the feeling of isolation and the lack of peer group support. Teleconferencing overcomes this problem by putting students in touch with one another and making

it possible for difficulties (and successes) to be shared. Students also mention that teleconferencing increases their motivation both to complete work schedules for the telephone meeting and to attend the meeting itself with greater concentration. Because of virtually unlimited telephone access in the UK, teleconferencing can meet specialist needs which would otherwise go unheeded. For example, courses which would not run because there would not be sufficient interest in the immediate catchment area to warrant them, can now dip into a national pool of potential students. Equally, specialist expertise need not be confined to one institution alone, but can be accessible to any number of staff or students via teleconferencing.

Time and money can both be saved by teleconferencing. Most meetings are achieved with greater economy this way and travelling time, with resultant work loss, ceases to be a problem.

Teleconferencing can enhance the efficiency of the meetings/lectures/tutorials that take place, by emphasing pre-conference preparation and on-line discipline. The focus on the work in hand becomes crucial in a medium which is usually unaided visually, and, experience has shown that problem solving and decision making are achieved more readily.

3.2 How it is being used

There is a vast range of current usage of the method in the business management field e.g. for meetings (including emergency and supplementary meetings) for getting people with time and travel problems together; for utilising scarce resources e.g. inclusion of important people (perhaps visitors from abroad) with heavy work schedules.

Education and training fields experience of the medium -

University of Wales College of Medicine: Cardiff

The Welsh National School of Medicine uses a combination of audioconferencing and videotaped material to tutor groups of students dispersed in local hospitals for their clinical training. Initial theoretical training is given in the Cardiff School, but clinical training begins very early, and students used to have to travel in from fairly distant centres. The School now uses a system of linked tutorial teaching to tutor students or groups of students at different distant locations. Student feedback after two years of use of this system is very positive with over 90% stating that they feel "involved" in turorials and 53% preferring linked turorials to small group, self-teaching or block lectures.

Educational Administration

The School of Maritime Studies at Plymouth Polytechnic used the PACNET audioconferencing facilities fortnightly to discuss the problems and practicalities of manning and updating a new Merchant Fleet. The conference call usually involved nine participants at seven different Polytechnics throughout the country.

Small Business Training

Enterprise Initiatives in the South West used the PACNET service for administrative purposes.

Charing Cross and Westminster Medical School

The School has developed a closed circuit interactive television system (compressed video) linking the six hospital sites together. This is used for truly interactive television teaching sessions that can be put out from any hospital to any or all of the others.

Fibre optic cables carry video and audio signals through the system giving high quality sound and vision. In addition to visual live action, many other teaching aids can be transmitted together with suitable audio channels - e.g. 35mm transparencies, OHP slides, videotape, direct microscopy and radiographic investigations.

The System includes 8 teaching stations, with monitors and microphones installed in seminar rooms in the associated hospitals. There are specially designed consoles in lecture theatres from which the lecturer can control the audiovisual facilities and respond directly to questions from anyone in any of his or her audience.

It affords more practical experience in the wards for students as it cuts out travelling time/expense for students and staff.

The Open University

The Open University uses audioconferencing:

- for teaching students
- for training tutors
- to enable tutors to keep in contact with each other
- to hold internal meetings all over the university.

Audioconferencing is used more and more frequently and is proving very useful for students living in remote areas of the UK and particularly in Scotland.

One problem which the OU encounters in using audio-conferencing in outlying areas is that these are often served by old telephone exchanges and poor telephone lines, which make communication difficult and unreliable. A small working group, Telephone Users Group (Scotland), chaired by Dr Judith George (OU Scotland), has been formed as a sub-group of the Scottish Committee on Open Learning to co-ordinate the use of audio-conferencing and other forms of telecommunication in distance and open learning systems. The group has recently held a seminar, "On The Line", which aimed to inform delegates about the range of equipment available, its possible combination with other media and the training necessary for adaption of skills. Input was given, in many cases by phone, from a variety of projects all over the UK and from Athabasca in Canada. The group hopes to go on to increase awareness of the potential of the medium at all levels of educational work and to be a focal point for discussion with British Telecom about the application of their services to educational needs in Scotland.

For further information about the Telephone Users Group (Scotland) Tel: Dr Judith George (031) 226 3851.

The PACNET project supported two courses in the South West.

1. Audioconferencing in Open Learning: One-Year Business & Technical Education Council (BTEC) Single Unit Certificate in Electronics 2 & 3

This unit is offered by Plymouth College of Further Education and taught by a panel of four Electronics lecturers.

For one year, audioconferencing and telephone tutorials (via PACNET) were used to re-inforce the course textbooks, electronic lists and college seminars. Students took part in one audioconference a term and telephone tutorials in addition. They worked at their own pace, but could contact staff for guidance.

The audioconference component was optional in that it operated on a phone-in basis. Students telephoned a mini panel of electronics experts for any course information or help they needed, but there was no requirement that they used the facility. The college was equipped with PACNET telephone lines and Darome Convenor conferencing equipment to facilitate the sessions. The advantage to students was that they could hear each other's problems and become a part of the support network. Such calls also worked to diminish the sense of isolation often experienced by students whose contact with each other is limited.

2. Audioconferencing in Distance Learning: One-Year Diploma in Acoustics and Noise Control

Camborne Technical College offers this Diploma as a post qualification course for Environmental Health and Industrial Safety Officers. The Acoustics Tutorial was the most frequent user of PACNET. The course taught using a variety of delivery methods including taped lectures, a practical 3 day session, individual telephone contacts and fortnightly tutorials by audioconference. Students rang into the bridge at conference time from places as far afield as Edinburgh, Jersey, Dorchester and Liskeard.

A consistent problem encountered was bad telephone lines from Camborne to Plymouth. Nonetheless, both parties appeared to benefit from the immediacy of the medium. Camborne had the use of Darome conferencing equipment and PACNET audio and data lines were installed at the College.

University of London Department of Extra-Mural Studies

The University of London Audioconferencing Research Project took place from January to May 1985. This was a study of applications at Birkbeck College, The Royal Veterinary College and the Department of Extra Mural Studies. The aims of this study were to gain experience and information from those involved in audioconferences and to assess the viability of audioconferencing in an educational context. It was concluded from observations that audioconferencing is feasible and useful in a range of situations. BT's Confertel Bureau was used and participants (groups) used a Conference 2000 Unit.

Further details from Dr David Armstrong, University of London, Department of Extra-Mural Studies Tel 01-636 8000 X3835.

Royal Veterinary College, Unit for Veterinary Continuing Education

Subsequent to participating in the initial Research Study outlined above, further programmes of seminars for veterinarians which include the use of audioconferencing are being offered. A variety of topics are included and participants are loaned a Northern Telecom Companion free of charge.

For further details contact Dr Jenny Poland, Royal Veterinary College. Tel: 01-387 2898.

Distance Learning and Supported Self Study Project - Gwynned

The County Unit established within the TVEI project, and based at the Technology Centre, Llangefni, has started working with audioconferencing in two main areas - Music and Technology. A 20-line Darome Bridge has been installed and office personnel have received initial training in its operation and management. Conference facilities have initially been leased for trial in advance of any purchase. Subsequent to familiarisation with the facilities a number of conferences have taken place.

For further details contact the CET Supported Self Study Project Coordinator, Philip Waterhouse. Tel: (02217) 2037.

Devon Open Tech

Devon Open Tech has used audioconferencing in its staff development programme for its seven Field Officers situated in further education colleges throughout Devon. For these Field Officers to meet is costly in time and travelling, some of them having round trips of about a hundred miles. Audioconferencing provided a cost-effective solution and made possible meetings that otherwise could not have taken place. Currently Devon Open Tech is building audioconferencing into tutorial support systems, for example, audioconferencing will form an integral part of an in-service course this autumn for TVEI teachers in the Isles of Scilly, Cornwall and North Devon. Audioconferencing is seen as an important tool in creating flexible and open learning systems in rural areas like Devon where the population is widely dispersed.

OTSU

OTSU Ltd is the consultancy company which has been formed from the former Open Tech project "OTTSU" (the Open Tech Training and Support Unit). OTTSU was one of the first Open Tech projects to be set up to provide staff development and consultancy support to other Open Tech projects. It worked with over 100 Open Tech projects, using experienced open learning practitioners from all over the UK as consultants. OTSU Ltd now provides consultancy, staff development and open learning services to major national companies as well as to government departments, public bodies and Open Tech projects.

Audioconferencing in OTSU Ltd is not regarded as a second-rate alternative to meeting face-to-face. Through practice and through knowing each other well, the OTTSU team of tutors can use this medium for important business when needed and have developed effective audioconferencing skills. As a follow-up to a training workshop on "Tutoring and Supporting Open Learners" for an Open Tech project in the north of England, the team were given experience of audioconferencing about three weeks later by an OTSU Ltd Senior Consultant. As a result of this experience it is intended that these tutors will be able to build this tool into their work with students on a nationally spread distance learning scheme.

Audiographic Experiments

The Aregon Excom 100 System, which updates the OU Cyclops has been trialled by Tiverton College and by Camborne College and the College of St Mark and St John Plymouth. The system is a dedicated graphics computer and software capable of producing high resolution graphics which can be used interactively. The investigation, which was part of the PACNET project, proved that the system at present only works well if extensive planning and preparation in advance of its use are undertaken.

4. PACNET

The Plymouth Audioconferencing Network Project (PACNET) was the most comprehensive survey of educational audioconferencing as yet undertaken in the UK. It was sited in Plymouth Polytechnic, funded by CET, MSC, Plymouyh Polytechnic and British Telecom and ran from February 1984 to March 1986.

PACNET's aims at the outset were to disseminate the concept of meeting by telephone, to offer a service which made such meetings possible, and to investigate the educational potential of these meetings. To this end, over three hundred meetings, meeting the needs of an extremely varied group of users were scheduled. These meetings were for teaching purposes and other uses and the following are some examples of the ways in which the medium supported teaching and learning.

* Work Placement: Kept students in the field in touch with home base
* Distnce Learning: Regular tutorials supported text and kit-based learning
* Phone-In: A non-compulsory advisory service dealt with ad hoc student queries
* Lecture: Not advisable as a standard application, but useful for the occasional distant expert
* On Line/Off Line Teaching: A break in the middle for thought and discussion aided on-line interaction
* Audiographics Teaching: Early trials revealed both the snags and the great potential
* Teaching at more than one centre: Made minority subject teaching an economic possibity

Administrative users were quicker to grasp the benefits of audioconferencing. Polytechnics scheduled meetings to discuss microelectronics, librarianship, shipping and social work, and educational authorities held phone meetings to look at community education. Open learning experts met to discuss papers, and open learning support units developed strategies by meeting field officers by telephone. PACNET users have, for the most part, been very pleased with the savings on time and travel, impressed by the efficiency of the medium and convinced that telephone meetings are a useful augmentation to traditional meetings. However, not all applications were suitable for telephone meetings. Those demanding a high level of visual input, for example, or involving complex mathematical equations need a development in audiographics to meet their needs fully.

The formal evaluation of the Project highlighted a number of issues that lead to the conclusion that it would be inappropriate to continue PACNET in its current form at this time. Firstly, developments in audioconferencing bridge technology are leading to the availability of bridge facilities at low cost on standard different PABX systems, and therefore primary usage in the future will probaly be through local bridges under direct tutor control. A national system with significant human interfacing operates at a high cost level and prevents absorption of costs into normal operations. Secondly, practitioners do not appear to be ready yet to incorporate audioconferencing into their general education and training practices. Finally, the technical quality of the public telephone network is still insufficiently developed to provide the quality of service that audioconferencing demands.

Nonetheless, the work of the Project is regarded as having been both significant and positive in exploring the ways in which audioconferencing can contribute to education and training. The use of all types of communications technology including audioconferencing will certainly become more prevalent within education and training over the coming years and the work of the PACNET Project will prove to have been invaluable.

Dissemination of the Project's work is underway and includes Guidelines for first time users, a CET Working Paper and three videos.

For further information contact Jane Burton, CET.

5. Getting started

5.1 Educational applications checklist

You can use audioconferencing for any - or all - of the following:

- review the outcome of a face-to-face meeting
- 'bring in' an expert (by phone of course)
- update staff on new developments
- contact students on work placement
- tutor a group of students
- set up a distance learning unit
- set up a phone-in
- plan future face-to-face conferences
- assist educational administration.

5.2 Choosing services and equipment

Use Available Networks and Services

To find out about teleconferencing, take advantage of the experience and expertise of networks and services that have a wide experience of user and application needs. Above all, it is essential to use the medium rather than just to read about it or talk about its potential. The experience will tell you so much more than the most informed pamphlet or book on the subject.

Borrowing, Leasing or Buying Conferencing Equipment

To join in an audioconference you only need an ordinary telephone. However, after trying a conference or two, you may well want to consider using equipment (a loud speaking device) which will allow you to keep your hands free. Some networks will loan you equipment to try it out, some will hire equipment to you. Once you have used equipment, you will appreciate how easy audioconferencing becomes, particularly if you are planning to conduct long meetings or tutor students. Contact Networks for information on loaning or hiring and vendors direct for purchasing.

5.3 Setting Up Your Own Network

Setting up a teleconferencing system of your own needs careful investigation and planning. It is not just a matter of hardware, but of personnel. The need for staff whose job it is to run the system you adopt is often overlooked, and yet may be the most expensive budget item. It may well make more sense economically to use existing public audioconferencing networks. However, if your feasibility study positively indicates a system of your own, you will need to consider:

- the type of system to adopt
- whether to buy or lease hardware
- location of hardware
- whether to construct a special teleconferencing room
- site equipment
- installation of further telephone lines
- staffing and staff training
- maintenance

If you wish to charge for the use of your network you will need a Value Added Network (VANS) licence from the Department of Trade & Industry.

Section 8 provides information on services and equipment available.

5.4 Help with using Teleconferencing

Guidance Notes in the use of teleconferencing were produced by the PACNET project, and a series of three videos on audioconferencing will be completed during the summer of 1986.

* A general introductory video
* A video aimed at the educational user
* A video aimed at the business user

Further information about the videos, the Guidance Notes and about audioconferencing in general is available from Jane Burton at CET Tel: 01-636 4186.

The Open University has produced "On the line" (P519), a new pack consisting of a booklet and cassette designed for those who use the telephone for giving advice and information or for distance learning teaching and discussion. The cost is £10.

For further information contact any OU Regional Office or order the Pack from Learning Materials Service, Centre for Continuing Education, The Open University, PO Box 188, Milton Keynes MK3 6HW.

Both the Darome Connection and British Telecom Confertel Bureau, who offer audioconferencing services, issue guidance notes for helping users plan and run telephone meetings.

6. The technology

This section hopes to remove some of the mystique behind the concept of 'Telecommunications' and to give some tips on how to choose equipment and make the best use of it. After all audioconferencing is a brilliantly simple concept - all an individual needs to take part in one is a telephone.

The Telephone System

Audioconferencing and the telephone system work well together most of the time. The major problems are caused by noise which can affect the operation of conference bridges and loudspeaking telephones, and hence the intelligibility of the conference. Noise emanates from the telephone circuits or the participant and his or her environment.

Noise from the telephone system: It always pays for the participant to consider the quality of the line that they intend to use in advance. If the line or the telephone appears to be noisy seek advice and have it put right.

Noise from the participant and the environment: This sort of noise is always avoidable. Firstly, choose a quiet location where you won't be disturbed. If you are using a hands-free telephone, remember that background clatter and chatter can affect your own concentration and the amount of speech that other participants actually hear. If you are using an ordinary telephone, make yourself comfortable and don't tap on the handset, that too can interrupt what the others are hearing.

Finally, direct telephone lines are preferable to switchboard extensions for reliability and accessibility. Two telephones on one line should not be used as this leads to a considerable loss in volume. If you are worried about noise problems during a conference ask the operator for advice.

The Equipment

Individuals can take part in an audioconference with a normal telephone, but for more relaxed listening or for groups or special applications, there is a range of alternatives. You will benefit by seeking advice on the choices available and trying out the equipment.

The Loudspeaking Telephone (LST)

This is a telephone with the addition of a microphone and loudspeaker which can allow up to three people at one site to participate. The LST uses a technique called voice switching which prevents the microphone and speaker from 'howling'. The technique allows speech to travel in one direction at a time only and in fact acts as an aid to conference discipline. The audio quality of LST is variable - the best ones have separate mains power supplies.

The Loudspeaking Unit (LSU)

This is simply an add-on box containing the voice-switching, microphone and loudspeaker. It is used in conjunction with an ordinary telephone on direct exchange lines or pbx extensions but not with modern key-phone systems which often have special wiring. The LSU can be beter than an LST for small group use.

The Group Conference Terminal

This is the name given to devices such as the BT Conference 2000 and the Darome Convenor. Both devices can be likened to the LSU but are designed to be used by larger groups. Both allow you to record conferences and, with the addition of extra microphones or a P.A. system, allow you to interact with any size of audience in any location.

Room Acoustics

This is an important aspect and has a major effect on the quality of a conference. This is especially true when using devices which have omnidirectional microphones such as the BT Conference 2000. Where a room suffers from a bad echo, these devices will have to be supplemented with directional microphones in order to overcome the problem. The LST and the LSU have directional microphones and are usable in all but the worst effected rooms. The equipment supplier will advise on the best equipment to suit the application.

The Conference Bridge

This is a clever piece of equipment which combines the telephone lines under the control of an operator (an important human interface). The lines are amplified to ensure all participants hear equally well and voice-switching is used to prevent the system from becoming unstable. These bridges are used by companies providing public audioconference services and can also be bought by organisations who wish to provide their own. If an organisation wishes to charge for its services it must have a Value Added Networks licence from the Department of Trade and Industry and operate within strict guidelines.

High Quality Audio

If high quality audio is required between a small number of sites a system called Orator is available from British Telecom. Orator uses two telephone lines per location and up to four sites can be linked together via a special Orator Multipoint bridge. This system gives realistic duplex communication between sites, but is relatively inflexible because of its design. It cannot link ordinary telephones in the same way that a conference bridge can.

Graphic Devices

This title implies the transmission of images between sites, sometimes with the capability of being modified interactively by means of a light pen on a screen or a pen on a digitising pad. This information is transmitted as data from the device and can be passed through a conference bridge to other identically equipped sites. This data conference is separate from any audio one so that effectively there are two running in parallel.

Slow Scan TV

The technology is flexible and works in normal lighting conditions. It can be used to send pictures of people or objects. A Camera, control box, and screen is connected to the telephone line. The still image is stored in the electronic memory of the slow scan system and when required, the destination site or Bridge is dialled and the image sent down the telephone line on command.

Full Motion Video

Compressed video will be the technology most likely used in the future. A 2 Mbits telephone circuit is required and this links two sites together. Both locations have to be equipped with several cameras, TV screens and the audio and video equipment and in fact become small TV studios. There are no such things as video bridges, and audio bridges are not suitable for this purpose, so to be able to link more than two sites requires duplication of all equipment as each site links with every other site individually.

7. Glossary

Audioconference
A meeting by voice of people at three or more distinct sites which have been linked by telephone connections.

Agenda
A written meeting plan which specifies what items will be covered during the audioconference and how they will be processed.

Bridge
A telephone switchboard used to link three or more telephone calls into a common circuit for group conferencing.

Chairperson
The person responsible for guiding teleconferencing participants through an agenda and ensuring they have the opportunity to contribute to the meeting.

Clipping
The cutting off of syllables or words by the voice-switching mechanism of an audioconference bridge or loud speaking telephone. The bridge switches to the loudest signal and clipping results if it has to decide between two voices speaking at once.

Conference Call
An operator-assisted telephone meeting which allows three or more individuals or groups to communicate with each other.

Network
A system which allows distinct people or sites to be interconnected.

Organiser
The person responsible for planning the conference, developing an agenda, arranging the conference schedule and providing participants with all necessary information.

PACNET
The acronym for Plymouth Audioconferencing NETwork.

Scheduler
Someone with responsibility for assigning conference dates and times, suggesting equipment for use, assigning a bridge number for the conference and providing "call-in" instructions.

Site
Location of individual or group involved in a teleconference.

Teleconferencing
Includes the whole range from audioconferencing to Satellite video.

Voice-Switching (see clipping)
A phenomenon peculiar to audioconference bridges and loud speaking telephones which prevents the system becoming unstable, and allows one person to speak at a time.

8. Services and equipment

8.1 Services

British Telecom's CONFERTEL Bureau Service

This is available through British Telecom Audioconferencing.

Features: A professional service able to link many telephones at one time wherever they may be. Audioconferencing participants either call the Bureau themselves or the Bureau operator can call them.

Audioconference participants can join in from wherever they have access to a telephone. The Confertel Bureau Service can handle up to 40 lines in one conference in normal circumstances, and up to 4 simultaneous conferences.

This service is able to convey images, as well as speech, in the form of half-duplex data transmission. The normal situation is for two conferences to run in parallel, one for data and one for speech.

The Confertel Bureau Service is used by a variety of commercial and educational institutions including the University of London for extra mural classes and tutorials, the OU, Liverpool Polytechnic and the Royal Veterinary College. Special terms are available to educational users.

To book a conference: Telephone 01-240 9678 or 01-253 6041
Further Information:- Contact Geoff Fox
Confertel Bureau
Europa House
13-17 Ironmonger Row
London EC1V 3QN
Tel: 01-240 9678 or 01-253 6041

The Darome Connection

Features:- The Darome Connection uses teleconferencing technology and ordinary telephone lines for multi-site meetings that require no purchase of equipment. In the USA this system has accommodated up to 260 callers at a single meeting. Darome designs and manufactures the equipment basic to the service, known as 'bridges'. These link callers together. The system is voice activated so just one person can speak and be heard at a time, eliminating cross talk. Participants can use any telephone to call in or be called. During the conference, a Darome operator stands by to ensure a clear connection and to handle any problems that may occur. The system allows large conferences to be divided into sub-conferences or small discussion groups. Additional facilities are transmission of data on analogue facsimile machines and images and graphics on slowscan/freeze frame video.

To book a conference telephone 01-879 1000
For further Information:- contact The Darome Connection
2 St Mark's Place
Wimbledon
London SW19 7ND
Tel: 01-879 1000

8.2 Equipment

All the devices listed here can be used on the Public Switched telephone Network and are normally associated with a standard telephone so that calls may be made and received.

8.2.1 Telephones

Standard telephones and loudspeaking telephones can be obtained from British Telecom or private telephone shops. Check that all the equipment used bears the Attachment Approval Label 'Green Spot'..

8.2.2 Conference Equipment and Services (Audio)

Companion
A loudspeaking attachment for 'hands free' operation. It connects to a standard telephone and BT jack socket. It is a combined microphone and speaker unit about the size and shape of a small tape recorder. Mains powered, it provides high quality output from the powerful amplifier/speaker, and it has a wide angle sensitive microphone. Typically used by 3/4 conferees, but can also accommodate others listening only. BABT 'Green Spot' approved.

Conference 2000
A portable modular conference terminal with omni-directional microphone and dynamic speaker for use on a conference table. It comes with a separate, easy to operate, control module which connects to a standard telephone and BT jack socket. The 2000 can be linked to additional microphones and/or PA system to accomodate a wider listening audience. BABT 'Green Spot' approved. Mains powered.

Further information about the Companion and Conference 2000 which are both manufactured by Northern Telecom from:

British Telecom
Network Nine Audioconferencing
Unit 7
Leatherhead Industrial Estate
Station Road
Leatherhead
Surrey KT22 7AF
Tel: 01-636 3003

Darome Convenors
The model 1610 is a table top loud speaking unit comprising individual push to speak microphones and a loudspeaking unit. Any number of microphones can be joined in chain fashion and plugged into the Darome convener. The voices of participants both present in the room and at the other locations can be amplified.

The model 730 is a Duplex hands free loud speaking unit which tunes itself to the conditions of the telephone line and room accoustics.

For further information about the Model 1610 or 730 Convenors contact:

Darome Connection
(address above)

Orator Terminal and Multipoint Bridge
A high quality 4-wire conference system offering full duplex speech and requiring two telephone lines per location. An Orator Multipoint Bridge is also offered which can combine up to four or eight Orator Terminals. It is unique in that it compensates for room acoustics.

For further information contact:

British Telecom
Network Nine Audioconferencing
(address above)

8.2.3 Bridges

Confertel Bridge
This is the same equipment that is used for British Telecom's Audioconferencing service. The basic unit offers 10 lines which can access each of two parallel conference circuits. The equipment has all the necessary control features and can be used on direct exchange lines or private circuits.

For further information contact:

British Telecom
Network Nine Audioconferencing
(address above)

Darome Bridge
The Meet-Me Bridge (Model 2020) is the equipment used by the Darome Connection Bureau Service. There are two versions and both have call-in and call-out capability. The larger version can mix 2 conference bridges of more than 5 lines each simultaneously. Tape play/record facilities are available on both versions.

For further information contact:

Darome Connection
(address above)

8.2.4 Conference Equipment (Visual)

Electronic Writing Board
A normal whiteboard surface but the information written on it (in colour as well as black and white) is transmitted down a phone line to a colour screen at the distant end. Images can be prepared and stored on a built-in floppy disc system and hard copies produced.

For further information contact:

British Telecom
Network Nine Audioconferencing
(address above)

CV250 Slow Scan Television
Features:- For point-to-point or multi-location communication, the CV250 slow scan system is available as part of a range of audioconferencing equipment. Black and white still TV pictures are transmitted over the telephone network in 36 seconds providing an inexpensive solution where viewing is essential to the success of the conference.

For further information contact:

British Telecom
Network Nine Audioconferencing
(address above)

Imtran Slow Scan Television
Features:- Similar to the CV250 but British mode.

For further information contact:

British Telecom
Network Nine Audioconferencing.
(address above)

FAX
FAX, or facsimile equipment allows for the sending of exact copies of documentation (charts, diagrams, foreign language documents etc.) to the other side of town or to the other side of the world at very high speed over normal telephone lines. Both the sender and the person receiving the document need a telephone line and a piece of equipment that looks much like a photocopy machine. This can be a useful accompaniment to a teleconferencing session where accurate printed documentation is required fast.

For a comprehensive analysis of types of Fax machines see Business Equipment Digest June 1986 (p.37-50).

BT Videostream
Can install videoconferencing equipment in customers own premises. However, it is only possible to have this service in organisations that already have high speed digitel transmission links (system X).

For further information contact:

BT Videostream
Angel Centre
403 St John Street
London EC1V 4PL
Tel: 01-239 1313

Videoconferencing
BT Confravision offers a videoconferencing service. There are about 10 videoconferencing studios in the UK which allow groups at two sites to see and speak to each other. Full motion colour or black and white video signals are sent by digital transmission between the sites.

For further information and booking contact:

British Telecom
Network Nine Confravision
19 Stratford Place
London W1N 9AF
Tel: 01-929 9999

Video Teleconference Codec
This is the system which compresses wide-band TV (in either colour or monochrome) into digital information so that it can be sent down narrower bandwidth digital transmission lines or satellite channels. This equipment can be used two-way audio and two-way video, or two-way audio and one-way video.

For further information contact:

GEC Video Systems
79 Silver Street
Reading
Berks RG1 2SZ
Tel: (0734) 864490

Internet
Internet Technology Ltd offers a national switched videoconferencing service. A 'switched' service is one that can switch videoconferencing calls between any number of sites (rather than just point-to-point). Internet provides full motion colour video with sound, graphics and simultaneous transmission of data and fascimile (FAX) if required. Digital transmission links are required and Internet uses the Mercury system.

Videoconferencing that is accommodated within a cable television operators area can be linked to the cable system which can transmit the videoconference session to all or selected subscribers to the cable company. Some cable TV companies have interactive systems including Windsor TV (Internet is a subsidiary of Windsor TV).

For further information contact:

Internet Technology Ltd
Trinity Court
5 High Street
Windsor
Berks SL4 1LD
Tel: (0753) 840040

9. Selected reading

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